AIR WAR COLLEGE

RESEARCH REPORT

THE OPERATIONAL LEVEL OF AIR WARFARE

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THE OPERATIONAL LEVEL OF AIR WARFARE

by

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EXECUTIVE SUMMARY

TITLE: The Operational Level of Air Warfare

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Provides a theoretical and conceptual framework for examining the operational level of air warfare. A description of Air Force doctrine and and its relationship to the operational level of war, and an examination of the components of airpower form the basis of the study's framework. These concepts are then surveyed in light of the types of war that may be encountered from an airpower perspective, and the classical effects of war as discussed in Clausewitz.

The interaction of these elements are analyzed using historical and theoretical examples. The study is designed to provoke discussion and reflection among Air Force officers who are interested in operational war and campaign planning. The conclusion points out the need for flexible and critical thought present and future commanders should develop as they attempt to come to grips with this complex and timely problem of operational level air warfare.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Daniel J. Murawinski (M.S., Air Force Institute of Technology) is C-130E pilot with extensive operational experience in Europe, North Africa and the Middle East. In addition, he has had tours at the Air Force Academy where he was an Assistant Professor of Physics, and the Air Staff in the Doctrine and Long Range Planning Division under the Deputy Chief of Staff for Plans and Operations. He is a distinguished graduate of both Squadron Officers School and Air Command and Staff College. He is also a graduate of the Foreign Affairs Interdepartmental Seminar run by the Foreign Service Institute and Airlift Operations School. He is married to the former Nancy E. Schwalm from Wayne, New Jersey, and has three children: Heather, Rebecca, and Daniel. Lt Col Murawinski is a graduate of the Air War College, Class of 1989.

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CHAPTER ONE

AIR FORCE DOCTRINE AND THE OPERATIONAL LEVEL OF WAR

The operational level of war is receiving increasing emphasis in the military. This is spurred on, in part, by the Services' quest for "jointness" in the conduct of military operations and, perhaps more importantly, by a realization of the fact that the next war will find the U.S. military with a constrained force structure from which to operate. Moreover, although we have traditionally trained, organized, and equipped for conflict in large war scenarios, the most likely form of combat for the foreseeable future will probably be in the small war arena. But, make no mistake about it, these small wars will be characterized by highly lethal, sophisticated weaponry--"all weapons systems of the 1980's will be available to all countries in the 21st Century."[1] Furthermore, the rising cost of new weapons systems, some of which are highly specialized, coupled with long procurement times to replenish combat losses has made attrition warfare a thing of the past. For these reasons, our commanders must become proficient in the operational level of war. They must be able to employ combat power in a coherent, flexible manner that consistently strikes at the enemy's centers of gravity if we are to prevail in combat and achieve the strategic goals necessary for the political resolution of a conflict.

The role of airpower at the operational level is the subject of this paper. I will not attempt to address all the factors an air commander must consider when developing a campaign plan because war and the conduct of war are too complex for this short

study. Rather, I will attempt to provide a theoretical and conceptual framework to help guide the air commander as he prosecutes the air war. In this sense I will offer some considerations that are imperative--but not exhaustive--for a successful air campaign. I will begin by examining Air Force Doctrine and show how it applies to war conducted at the operational level. I will then discuss the components of airpower and relate these and our doctrinal tenets to the various types of war, from an airpower perspective, that a commander may encounter. Finally, I will examine some of the effects of war that may change doctrinal principles; stress airpower components; and force a transition in the air commander's campaign plan.

The operational level of war can be defined as

> "...that level encompassing the development and direction (including adaptation) of tactical level events in order to achieve strategic goals, within the constraints imposed by that level."[2]

This definition was chosen for three reasons: First, it recognizes the interrelationships among the strategic, operational, and tactical levels of war. Second, it allows for innovation by the commander. As Clausewitz points out, "...it is simply not possible to construct a model for the art of war that can serve as a scaffolding on which the commander can rely for support...talent and genius operate outside the rules, and theory conflicts with practice."[3] Third, it recognizes that war is a continuation of politics by other means and the political situation may impose operational constraints on the commander.[4]

The fact that so few books have been written on this subject, particularly from an Air Force perspective, is

surprising because ever since the Casablanca Conference in 1943, airpower has been employed at the operational level.[5] Prior to this conference, airpower in North Africa was parceled out into air support commands subordinate to army formations.[6] "Air operations reflected an addiction of Army commanders for protective umbrellas and a singular lack of understanding of both the capabilities and limitations of airpower."[7] As a result, Allied airpower was basically limited to defensive operations under individual Army commanders. Under these arrangements, theater forces could not effectively be massed to attack the enemy's warmaking potential. In contrast, German airpower during the early part of the campaign was able to concentrate its forces against both Allied ground and air assets. By flying defensively, American air units were able to protect neither themselves nor friendly ground forces, or to inflict serious damage on the Germans. The 33rd Fighter Group, for example, suffered so badly flying defensive patrols, they had to be relieved from combat.[8]

The Casablanca Conference was the turning point in the North Africa Campaign because it furnished the basis for employing airpower at the operational level of war. As a result of the Conference, unity of command for Allied airpower was established and the position of the Air Commander was codified. Theater airpower was placed under the centralized control of the Northwest Africa Air Force commanded by Air Marshal Tedder. For the first time, Allied airpower was employed in mass in gaining air superiority--the objective most crucial to the outcome of the North African Campaign.[9] Concurrent with the battle for air

superiority, strategic missions were directed against airfields and ports in Italy and Sicily, and against enemy shipping. Consequently, Germany was unable to provide the Africa Corps with replacements or supplies.[10] A quick end was in sight. On 19 April 1943, the air phase of the campaign to drive the Axis forces out of Africa began; by 30 April, air supremacy was achieved; on 13 May, the last of the Germans surrendered.[11]

This experience gave birth to the basic tenets of our current USAF doctrine:

1. Unity of Command
2. Gain Control of the Aerospace Environment
3. Employ Airpower as an Indivisible Entity[12]

Air Force doctrine provides the foundation for thinking at the operational level of war. In fact, only at the operational level do the three tenets of our doctrine make sense. At the tactical level Air Force units are tasked to accomplish specific roles and missions as specified by the operational level commander. Our combat airmen are concerned with applying appropriate tactics, techniques and procedures for missions such as counter air, reconnaissance, air interdiction, suppression of enemy surface-to-air defenses, electronic combat, and close air support. In addition, our combat support people are generating sorties; defending and repairing the air bases; ensuring adequate supplies of food, fuel and ammunition; and assessing weather and intelligence data. But only at the operational level is the air commander orchestrating the broad plan of action for gaining a sufficient degree of air superiority and determining the weight

of effort his forces will apply to tactical and strategic missions designed to destroy, disrupt or delay enemy forces and warmaking potential.

Unity of command is fundamental for employing airpower at the operational level of war. Yet in every theater of war in World War II, in Korea, and in Viet Nam the command and control of airpower has been a major issue. History has shown that airpower cannot be used effectively if it is largely parceled out in small packets to support ground unit operations. History has also shown that the command and control of airpower is often a contentious and emotional issue because ground and naval commanders desire to operate under an airpower umbrella designed to defend and protect their resources. Future commanders need to be aware of these facts lest they succumb to past mistakes and forfeit precious time as the lesson of unity of command is re-learned. They must ensure a "command structure....capable of using airpower in a variety of tasks simultaneously or in sequence."[13]

The need for air superiority cannot be overstated. "Since the German attack on Poland in 1939, no country has won a war in the face of enemy air superiority, no major offensive has succeeded against an opponent who controlled the air, and no defense has sustained itself against an enemy who had air superiority. Conversely, no state has lost a war while it maintained air superiority, and air superiority has consistently been a prelude to military victory."[14] Although the exact role of the Air Force in future conflicts will continue to be debated, particularly as high technology weaponry obscures traditional

Service missions, one fact will remain uncontested: "The most precious thing an air force can provide to an army or navy is air superiority, since this gives to surface forces the ability to carry out their own plan of action without interference from an enemy air force."[15]

Airpower is indivisible. When developing a campaign plan, an air commander must make use of both strategic and tactical actions to help defeat a potential enemy. "Strategic and tactical actions are not necessarily tied to specific geographic areas, operating environments, or type of vehicles. An air commander may employ any or all of his assigned forces to produce integrated strategic and tactical effects to support the overall objective. Strategic and tactical actions are not mutually exclusive and to consider one in isolation of the other disregards their interdependence and their synergistic influence in warfare."[16] These words from AFM 1-1, Basic Aerospace Doctrine, are becoming increasingly relevant for the modern battlefield as we look to improved ways of attacking an enemy to the depth of his warmaking potential. At the operational level, an air commander must make use of the appropriate type of delivery system needed to achieve the desired objective. These systems may include bombers for close air support as was used in Viet Nam and Korea, fighters for surgical strikes deep into enemy territory as we demonstrated in Libya, or Unmanned Air Vehicles (UAV) to attack both close and deep interdiction targets. The point is that an air commander must not succumb to the notion that bombers are used solely for strategic targets and fighters

for tactical targets; both can and should be used in concert with each other to produce the desired effect on the enemy. Gen B. L. Davis, a former commander of Strategic Air Command (SAC), summarizes this point quite succintly:

> "Indivisible airpower is not a new concept. In combat, the need to get the most from each airpower asset has regularly forced us to set aside artificial restrictions on how we employ our weapons."[17]

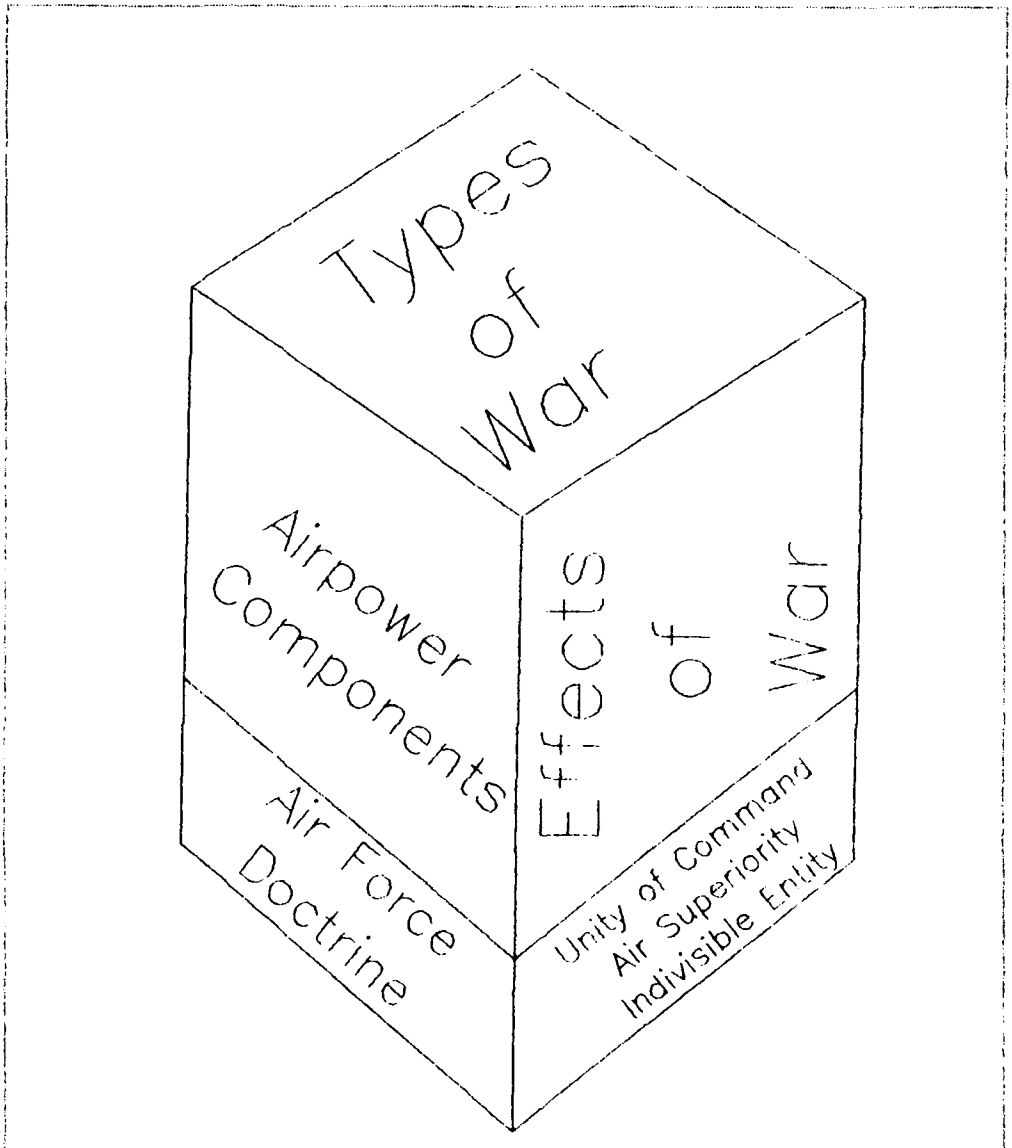

Figure 1. Conceptual Framework for Thinking About the Operational Level of Air Warfare

Although Air Force doctrine forms the foundation for thinking at the operational level of air warfare, it is but one piece of a larger puzzle. An air commander must also understand what components constitute his air power, the type of war he is engaged in, and what effect the war will have on his ability to defeat the opposing air forces. It is within this conceptual framework (shown graphically in Figure 1.) that I will examine the operational level of air warfare in the following chapters.

CHAPTER ONE NOTES

1. Daniel J. Murawinski, "Air Force 2020: A Guide to the Challenges of the Future," (Washington, DC: HQ USAF/XOXWP, 1988). This unpublished briefing was written, in part, by using the Alternative Futures Planning Scenarios developed for the Air Force in 1983 by the Futures Group of Glastonbury, CT.

2. Price T. Bingham, "Operational Level Warfare and its Implications for the U.S. Armed Forces," (Maxwell AFB, AL: Center for Aerospace Doctrine Research and Education, 1986), 1.

3. Carl von Clausewitz, On War, transl. and ed. Michael Howard and Peter Paret, (Princeton, NJ: Princeton University Press, 1984), 140.

4. Ibid., 605.

5. One exception is note 14 below, a useful work that provides a paradigm for analyzing air warfare at the operational level.

6. William W. Momyer, Air Power in Three Wars, ed. A. J. C. Lavalle and James C. Gaston (Washington, DC: U.S. Air Force, 1978), 41.

7. Air War College, Military Strategy and Force Employment Readings: Book 1, General Purpose Forces-DS 612 (Maxwell AFB, AL: Air War College, 1988), 336.

8. Ibid. 9. Momyer, 41-42.

10. Ibid., 43.

11. Readings: Book 1, 336.

12. Air Force Manual (AFM) 1-1, Basic Aerospace Doctrine of the United States Air Force (Washington, DC: U.S. Air Force, 1984). 2-8 to 2-13.

13. Momyer, 52-62.

14. John A. Warden III, The Air Campaign: Planning for Combat (Washington, DC: National Defense University Press, 1988), 13.

15. Momyer, 158.

16. AFM 1-1, 2-11.

17. Bennie L. Davis, "Indivisible Airpower," Air Force Magazine #67 (March 1984), 46.

CHAPTER TWO

THE COMPONENTS OF AIRPOWER

In 1941, Gen Henry H. Arnold wrote that airpower consists of three elements: man, the aircraft, and the air base.

> "Thus far we have considered the winged weapon and the winged warrior. The third major component of an air force is the air base and its constituent and essential elements."[1]

Although this view may seem overly simplistic in this age of high technology, it remains close to the mark. Given the changes that have made our aircraft, weapons and bases more complex, and the need for sophisticated command, control, intelligence and logistics capabilities, today we can view airpower as consisting of man, the aircraft, the air base and a support system (Figure 2). The synergistic combination of these ensure the availability, lethality, control, operability, and flexibility of our air forces.

This postulate of what constitutes airpower is based on historical precedent and doctrinal studies. An entire chapter of AFM 1-1 is devoted to the organization, training, equipping, and sustainment of aerospace forces. It emphasizes the need for unity of command and superior individual training.

> "Although the Air Force operates in a highly technical and dynamic environment, attention to the human element of professional military education and training is critical for establishing a competent, self-confident force."[2]

Regarding elements which guide strategic planning, Clausewitz identified such moral factors as "the skill of the commander, the experience and courage of the troops, and their patriotic spirit."[3] "Man", as a component of airpower, means not merely "aircrew", but the totality of "winged warriors" that comprise

our Air Force.[4] Victory in a future conflict will depend on highly skilled people in all echelons and functional skills performing as a "credible, cohesive warfighting team".[5]

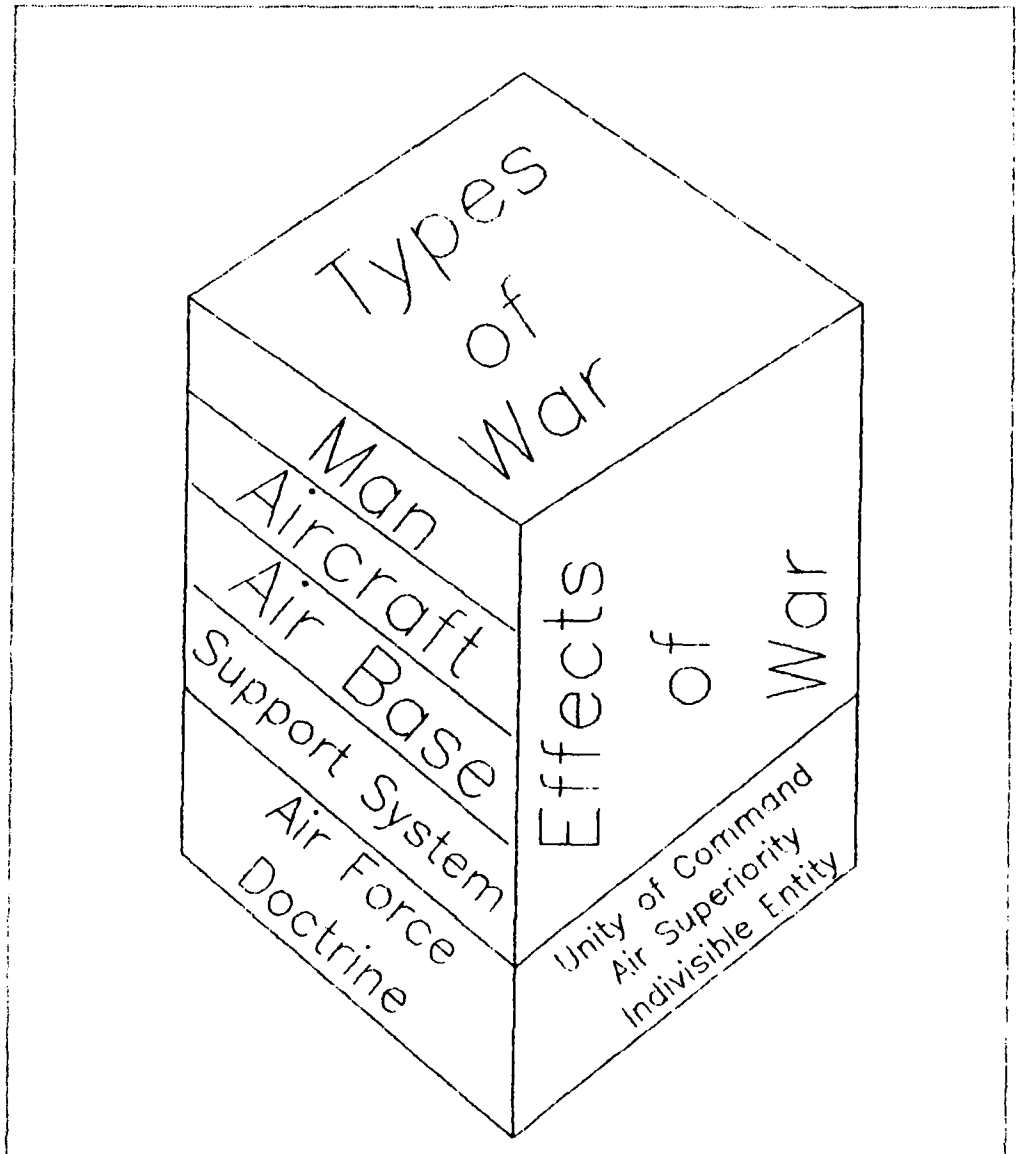

Figure 2. Conceptual Framework for Thinking About the Operational Level of Air Warfare

The second component of airpower is the aircraft. Today the term "weapon system" includes the myriad of people, supporting equipment, and weapons required to make the "aircraft" effective

in combat. Consequently, analyses of the effects of war on a weapon system becomes quite cumbersome. For example, a weapon system consisting of an aircraft with the right people and support equipment and loaded with weapons inappropriate for the mission may not be effective. In this case, an air commander is faced with the dilemma of employing the weapon system against other targets, or replacing the inappropriate weapons at the expense of delaying the mission. Such was the situation in Korea on 30 June, 1950. Loaded with 260 pound fragmentation bombs for an airfield attack, B-29s of the 19th Bombardment Group had their operations orders changed to attack the Han River bridges and enemy troop concentrations to the North. The fragmentation bombs were useless against the bridges and to reload the bombers with suitable weapons would take a minimum of six hours. Since the ground situation was deemed critical and the bombs could be used for antipersonnel purposes, the B-29s were sent to attack targets of opportunity north of the Han River. These attacks were ineffective in delaying the enemy ground offensive across the Han.[6]

In this example, the weapon system produced an ineffective sortie. However, enemy action that led to the inappropriate weapon load did not directly effect the aircraft, support equipment, pilots, maintenance crews, or even the weapon load itself (in this sense, the weapon system functioned perfectly). On the other hand, enemy action brought about a pressing need, in the mind of the commander, to destroy the Han River bridges and thus delay and disrupt the enemy attack. It was the decision-

making process of the commander that was effected by the war: by changing targets at the eleventh hour, he left himself with two bad choices. And, since man is considered part of the weapon system, we could argue that enemy action did effect the weapon system because the commander clearly has a role in making the weapon system effective in combat. Since such discussion will only tend to obfuscate cause and effect, we will retain the concept of the aircraft as one of the components of airpower. However, for the purpose of this paper, the term aircraft will denote "airplane". The remaining parts of the weapon system (people and the supporting equipment and weapons) comprise two other components of airpower.

The third component of airpower, the air base, is perhaps the least recognized, least understood, and per chance the most vulnerable component. There is a lack of doctrinal writing about the air base. AFM 1-1 makes no mention of the role an air base plays in the projection and application of airpower. AFM 1-10, Combat Support Doctrine, devotes less than one page to the subject, but nevertheless states strongly:

> "Bases are the critical junctures at which aerospace power is most dependent ... bases ... must survive to sustain combat operations."[7]

Perhaps our lack of doctrine on the role of the air base stems from the fact it is not a very interesting topic. As Gen Arnold wrote:

> "The subject of air bases is likely to be dull and uninteresting to the reader, for it does not have the appeal of the air battle. It cannot afford the stirring scenes of the swift fighters or of the mighty bombers. It is as dull as road building and as uninteresting as real estate development."[8]

Fortunately, the vital importance of air bases is recognized at

the highest levels in the Air Force. In 1983, Gen Welch as the HQ USAF Deputy Chief of Staff for Programs and Resources, said:

> "Few effective missions can be launched without a mission capable aircraft, a fed and rested crew, fuel, weapons, command, control, communications, a usable runway, and a secure, uncontaminated base from which to operate."[9]

Although there are many reasons to account for the lack of doctrine regarding air bases, two of the more predominant were our preoccupation with strategic nuclear weapon systems in the 1950's and 1960's, and the fact that historically we have operated from safe haven air bases which rarely came under sustained enemy attack.

After World War II, both the U.S. and Russia were contemplating expanding their strategic frontiers to enhance national security. The Soviets predominant interest was in Eastern Europe, the Artic and the Mediterranean. As U.S. and Soviet tensions rose from late 1945 onward, the U.S. began to develop plans in the event of war with the Soviet Union.

> "For the United States, Soviet aggression would mean total war. But given the generally weakened state of the postwar American military, the United States would initially have to go on the strategic defensive in the Pacific and the Far East and undertake a counter-offensive against Russia in Europe and the Middle East. The U.S. would rely on its strength: the use of long-range aircraft carrying atomic and conventional bombs against Soviet urban and industrial targets to destroy Russia's warmaking potential and will to fight."[10]

Consequently, U.S. planning required air bases capable of supporting strategic bombardment operations that could strike the Soviet homeland within the operating radius of B-29 aircraft. Although many sites were being considered as forward deployed air bases, the same fiscal constraints that forced a reliance on "cheap" strategic airpower to counter the Soviets, as opposed to increased Naval or Army forces, also restricted the location of

these air bases to the U.K., North Africa, the Middle East and South Asia.[11]

While the post World War II period may have been the beginning of our nuclear preoccupation, the events that followed the Korean war brought it to fruition. President Eisenhower was faced with the dilemma: "How could anyone balance the budget and still arm America for the Cold War?"[12] The answer was an overwhelming reliance on nuclear retaliatory forces and the concept of massive retaliation.

> "The major deterrent to aggression against Western Europe is the manifest determination of the United States to use its atomic capability and massive retaliatory striking power if the area is attacked."
>
> "Not only would nuclear retaliatory forces be the major deterrent, but the military forces should plan on using nuclear weapons if needed, and they should plan for reduced conventional force levels accordingly."[13]

This policy of nearly total reliance on nuclear forces to protect U.S. interests spanned almost a decade and a half of military thought. In fact, it was not until 1961 that the policy of massive retaliation began to give way to flexible response in which conventional forces "can be most usefully oriented toward deterring or confining those conflicts which do not justify and must not lead to general nuclear attack."[14]

Hence, doctrinal thinking concerning the warfighting role of the air base lagged that of the aircraft by over a decade. We did not have to think of the air base as a component of airpower because our nuclear retaliatory air forces would respond to aggression with massive attacks that would quickly render the warmaking potential of an adversary impotent. In addition, our

primary adversary, the Soviet Union, lacked naval power and a strategic air force which made our forward bases in the U.K. and North Africa relatively safe from a counter-attack.[15]

This brings us to the second point. American airpower has always operated from "safe-haven" air bases that never came under sustained enemy attack. During World War II, we operated our strategic bombers from U.K. airfields that were out of the Luftwaffe's reach. During the North Africa campaign, "the ability to move quickly and the large repair and maintenance facility in Egypt provided the Allies with an air force that could vacate threatened areas, replace battle losses, and quickly repair airplanes."[16] After the Normandy invasion, we made use of captured airfields in France to relocate our fighters and medium bombers to prosecute the war against Germany. At this time, total Allied air supremacy over the continent made German attack of our forward bases highly problematical. In the Pacific theater, General Kenney faked the construction of two airfields near the Japanese positions on the Huon Peninsula to draw Japanese attention away from from the real airfield he was constructing at Tsilli Tsilli some 50 miles away. The result was the Japanese would periodically attack the fake airfields while Gen Kenney moved fighters onto the real one. Because Gen Kenney saw the need and, shrewdly, orchestrated the circumstances to provide for a "safe haven" airfield, he was able to launch a mass attack on Wewak with fighter escorted bombers that took the Japanese totally by surprise.[17]

In Korea, Far East Air Forces (FEAF) initially entered the war from bases in Japan which did not come under attack by the

North Koreans. After the U.S. committed to the defense of Korea, FEAF would move some aircraft to the Pusan perimeter, but in the face of American air superiority the North Korean Air Force was never able to launch a sustained attack on U.S. air fields.[18]

Viet Nam reinforced the notion of "safe haven" air bases where, with the exception of harassing mortar and rocket attacks by North Vietnamese ground forces, our air bases remained immune from enemy air operations.

For these reasons, until recently, we have not devoted much thought on the role of air bases in the projection and employment of airpower. Consequently, we have acquired air bases that, in contrast to the way we acquire aircraft, are fragmented in design and construction, have subsystems occasionally supportive of one another, are optimized to be cost effective in peacetime, and are not exercised or evaluated under combat conditions.[19] Today, recognizing the threat from the Soviet Air Force, particularly in Western Europe, we have devoted considerable resources to harden our fixed facilities. We have adopted the strategy of fighting from hardened air bases even though we have no historical or doctrinal precedent for doing this. Clearly, more thought needs to be given to the air base if we are to ensure it does not become our achilles heel in a future conflict. Some options for the air commander will be discussed in the next chapter.

The final component of airpower, the support system, includes all the material and actions necessary to sustain combat operations. On the macro level, it can be viewed as the steel thread that binds the other components of airpower together as a

cohesive unit capable of being employed according to our doctrinal tenets. On the micro level it includes the weapons, fuel, transportation, spare parts, command and control assets and other war material necessary to assure the availability of aircraft; the facilities, training resources, combat gear, shelters, food, water and intelligence assets needed by our people to conduct prompt and sustained combat operations; and the equipment required to ensure the availability of water, electricity, fuel, runways, taxiways and communications to keep our air bases operational in the face of a determined enemy. In sum, the support system is that component of airpower that includes what has traditionally become known as logistics and combat support.

Hence, for the purposes of this paper, the components of airpower can be described as consisting of man, the aircraft, the air base, and the support system. Each component is a center of gravity for our Air Force because we cannot project and employ airpower unless each remains functional. Although there are many factors that can disrupt the components of airpower or work against doctrinal tenets, they can, in general, be grouped into two broad categories: the types of war we are engaged in; and the effects that war will have. The following chapter will explore the types of war that may be encountered, based on the relationship of opposing air forces, and offer some guidelines an air commander may wish to consider should he be faced with similar situations.

CHAPTER TWO NOTES

1. Henry H. Arnold and Ira C. Eaker, Winged Warfare (New York, NY: Harper Brothers, 1941), 61.

2. AFM 1-1, 4-6.

3. Clausewitz, 186.

4. Arnold, 26-59.

5. AFM 1-1, 4-6.

6. Robert F. Futrell, The United States Air Force in Korea 1950-1953 (Washington, DC: U.S. Air Force, 1983), 32.

7. AFM 1-10, Combat Support Doctrine (Washington, DC: U.S. Air Force, 1987), 1-2.

8. Arnold, 81.

9. Daniel J. Murawinski, "Warfighting Doctrine and Air Base Operability" (Washington, DC: HQ USAF/XOXWP, 1988). This unpublished briefing was prepared for the Engineering and Services community to help them develop Engineering and Services Doctrine. It was developed in part from AFM 1-10, the USAF Scientific Advisory Board summer study on Air Base Performance, and the work done by the Air Staff Air Base Operability Division (HQ USAF/XOORB).

10. Elliott V. Converse III, "United States Plans for a Postwar Overseas Military Base System, 1942-1948" (Princeton, NJ: Unpublished Doctoral Dissertation, 1984), 213-215.

11. Ibid. 231.

12. Air War College, Department of National Security Affairs Readings: Book 2, National Security Policy Studies-NS 621 (Maxwell AFB, AL: Air War College, 1988), 184.

13. Ibid. 185.

14. Ibid. 208.

15. Converse, 215.

16. John F. Kreis, Air Warfare and Air Base Air Defense: 1914-1973 (Washington, DC: U.S. Air Force, 1988), 173-174.

17. Warden, 32-33.

18. Futrell, 102, 109-111.

19. Murawinski.

CHAPTER THREE

THE TYPES OF AIR WARFARE

The operational level of air warfare is complex and perplexing to the air commander for the simple reason that the air battle is dependent to a large extent on the ground battle. By this I mean that although we can talk about air superiority and fighter sweeps, airpower must ultimately find a resting place where it can be refueled, re-armed and maintained. In addition, war in the air, in most cases, "is ultimately concerned with the possession or control of the ground," and unlike ground warfare where "man can choose his degree of dependence on machines; in the...(air),...he cannot live or move without them."[1] Moreover, since all of our forward deployed bases occupy "ground", they may be at extreme risk even in small wars. Consequently, the air commander must be concerned with not only the air campaign, but also the ground campaign.

With this as a backdrop, the types of warfare an air commander may have to fight hold numerous implications for both his doctrine and the components that constitute his airpower. A detailed analysis of this aspect of the operational level of air warfare could fill several volumes of books. Since this is beyond the scope of this paper, I will not attempt to describe every situation and implication a commander may face, but rather will provide an analysis of a thought process which should prove useful when confronted with a conflict. Although this analysis will be generic in nature, specific historical examples will be used to illustrate the points being made.

Not discounting the importance of the land campaign to the

air commander, this analysis will be accomplished using a paradigm that describes war in terms of the relationship of opposing air forces. The paradigm contains five cases:

> "In the first case, **Case I**, both sides have the capability and will to strike each other's bases.
>
> The second case, **Case II**, occurs when one side is able to strike its enemy anyplace, while the enemy can do little more than reach the front.
>
> **Case III** is the reverse of Case II and is a dangerous situation. Here, one side is vulnerable to attack but is unable to reach the enemy.
>
> The fourth case, **Case IV**, describes the situation in which neither side can operate against the rear areas and air bases of the enemy, and which air action therefore is confined to the front.
>
> The last case, **Case V**, could come about through mutually agreed political constraints or because neither side had any air power."[2]

Figure Three represents this conceptually by filling in another side of the three-dimensional matrix.

Regardless of the type of war an air commander is fighting, there are some critical decisions he must make and questions he must answer before the battle begins. Applying the proper weight of effort among defensive, offensive and close air support operations during the initial part of the war, and determining when and how to transition to different weights of effort are perhaps the most critical decisions he must make. This concept suggests the commander should use phases to achieve his strategic goals. The specific type of war, strategic goals, and enemy and friendly capabilities will largely determine the phases he should choose. In addition, he needs to answer such questions as:

> What are the strategic objectives I am tasked to achieve and how do I ensure my subordinate commanders understand my intent?

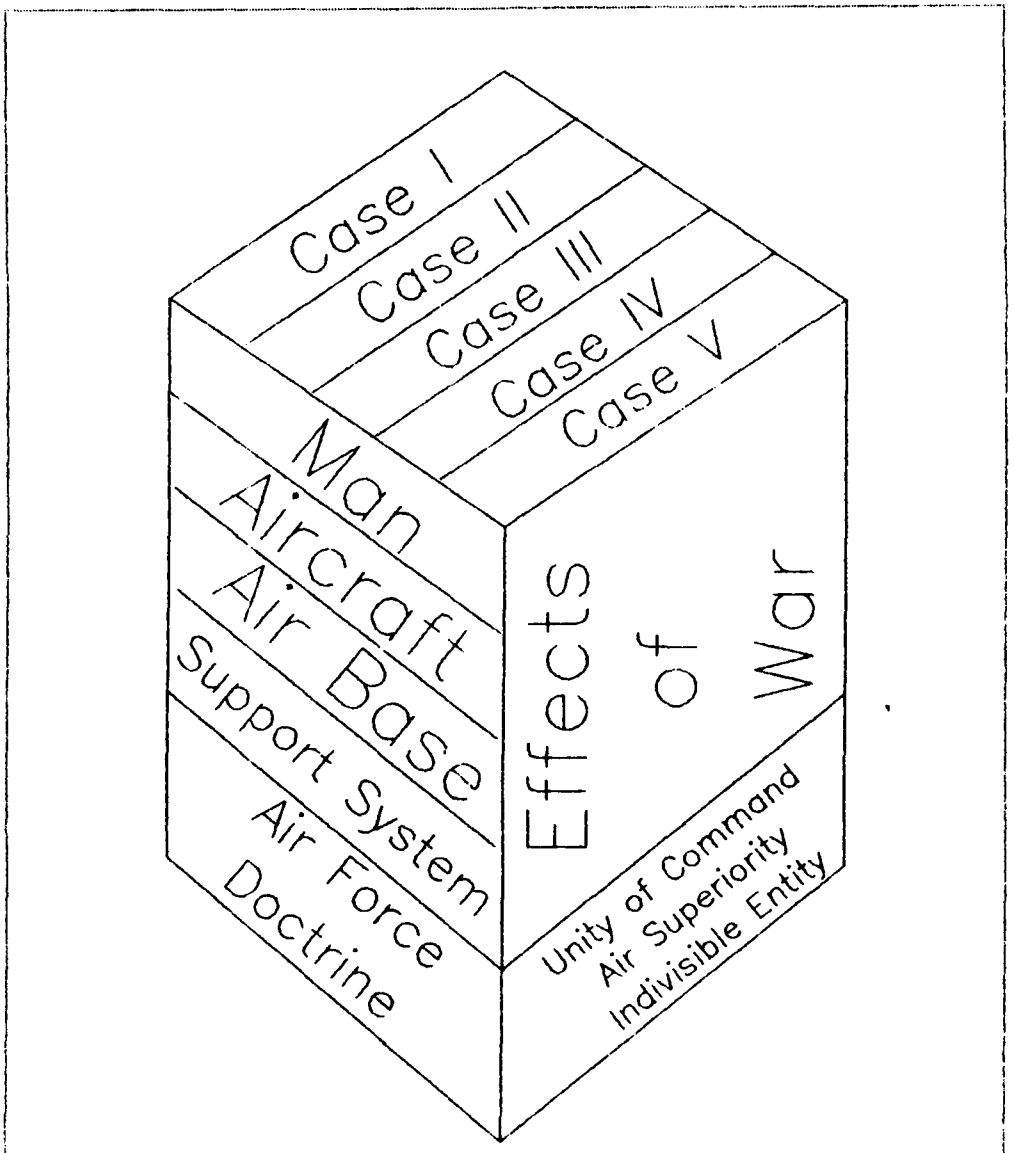

Figure 3. Conceptual Framework for Thinking About the Operational Level of Air Warfare

What are the enemy's centers of gravity which should be attacked to achieve my strategic aims?

What indicators do I have to help me decide the best time to attack his centers of gravity?

What are my centers of gravity and are they adequately protected?

Is my operational staff organized properly to conduct this campaign?

Do the command relationships provide the necessary unity of command to

prosecute the war? Are these relationships flexible enough to adapt to different situations?

What level of support should I give to the ground force commander?

What support do I need from the ground component commander to successfully prosecute my campaign?

Should the first phase of my campaign be defensive or offensive and when should the transition occur to the other?

Do I have the necessary aircraft in theater to achieve my goals?

How long can my support system sustain operations? Where are the shortfalls and how do they effect my strategy?

What alternatives do I have to operating from fixed air bases? Can I rely on additional airfields from our Allies? What type of servicing/repairs can be made at these airfields?

What are the political constraints on my strategy? Can I achieve my strategic goals given these constraints?

Will I be able to achieve theater air superiority or should I plan to conduct the war with local air superiority? What measures can I take to ensure I maintain control of the airspace above our forces?

Do the target lists make sense? Are the risks worth the potential gains? Would mission type orders be more effective than attacks on individual targets?

How can I take advantage of the enemy's doctrine? How can I prevent him from exploiting our doctrine?

Are there any key subordinate commanders that may be susceptible to the pressures and uncertainties associated with war? If so, when should I be prepared to relieve them and with whom should I replace them?

These questions may be stating the obvious, but in the heat of battle the commander may not have the luxury of reflecting on the campaign he has undertaken. The time to take stock of your situation is prior to the conflict when logical, objective answers can be made to questions as complex, introspective and operationally necessary as above. I will now move from the general to the specific as I examine each case and the challenges it poses for doctrine and the components of airpower.

CASE ONE

This situation is perhaps the most difficult one an air commander can face. It is a "chess game" whose goal is to win air superiority because the side that wins the air battle will "reap significant and perhaps overwhelming advantages."[3] If the air commander can gain and maintain air superiority over friendly airspace, **Case I** may evolve into **Case IV** which is a much less dangerous situation; if he can achieve general air supremacy, it will evolve into **Case II** where friendly airpower can control both the tempo and intensity of the conflict.

From a doctrinal standpoint, the air commander confronts two major challenges. First, he must balance offensive operations which are the cornerstone of Air Force doctrine with the need for defensive operations to preserve his warfighting ability. This may come about from two factors: the nature of the threat and the nature of the political constraints. If the enemy has a modern air force, nearly equal in capability to his own, an air commander must weigh the advantages and disadvantages of conducting an offensive air superiority campaign. In this instance, he may cede the initiative to the enemy by flying a preponderance of defensive missions designed to protect his assets while causing maximum losses to enemy airpower. On the other hand, a carefully designed offensive operation may overwhelm enemy defenses and disrupt the timing and tempo of his air campaign. Perhaps the air campaign will initially consist of two phases: defensive operations to make the enemy reach a culminating point; then offensive operations to wrest the initiative from the enemy and to exploit his weakened forces.

However, command and control of airpower must be flexible enough to make such transitions occur smoothly and in a timely manner. Such was not the case in North Africa in 1942. Although Luftwaffe doctrine called for attaining air superiority, Hitler insisted on relegating airpower solely to support the ground forces. Moreover, command and control of airpower was overly centralized and inflexible. The air commander was not collocated with the ground commander and hence could not keep up to date on friendly or enemy troop movements. Because of this inflexibility in command and control and German preoccupation with close air support and defensive counter air missions, they failed to exploit the opportunity of destroying Air Vice Marshal Coningham's tactical air force on the ground when the RAF reached a culminating point and left their bases vulnerable by rapidly withdrawing air forces to counter the Japanese seizure of Singapore.[4] The Luftwaffe, after relinquishing the initiative to the Allies, could not regain it. They failed organizationally and doctrinally to grasp the implications of the RAF pullback and seize the occasion to re-establish their offensive air campaign--they failed to gain air superiority. Defensive operations may be necessary during the early part of a campaign, but the continued reliance on defensive operations should be avoided--the best they can achieve is a draw and the worst is defeat. An air commander must identify the enemy's culminating point and be capable of switching from defensive to offensive operations to exploit his opponent's weakness. Political constraints may also limit a commanders options. The lack of border-crossing authority in

the early part of a campaign may force the air commander to emphasize defensive operations. Even when border-crossing authority is given, there may be prohibitions from attacking specific targets in the enemy's logistics infrastructure. Consequently, the commander must ensure his campaign and command relationships remain flexible enough to capitalize on the situation as the limits are lifted.

Second, in wars of this type, the air commander must be prepared for diversions. The enemy's offensive may cause critical ruptures in the front lines requiring offensive air assets to be diverted from their primary targets. Aircraft scheduled for interdiction and strategic missions may have to be used for close air support. Some of these diversions are necessary to prevent ground forces from being overrun. On the other hand, the tendency for ground commanders to want continuous air support is historical fact. The air commander must insist on unity of command and should not allow unnecessary diversions to thwart his efforts to gain air superiority and employ airpower in a decisive manner because, ultimately, air superiority is the best support an air commander can give to the other Services and airpower can be the decisive factor in the outcome of a war. The Israelis demonstrated this in the 1967 war against the Arabs. "With 196 operational combat aircraft, they destroyed almost 400 Arab aircraft on the ground in two days."[5] Israeli airpower was the decisive element in that conflict. In contrast, during Korean war, the continuous diversion of FEAF aircraft from interdiction and strategic missions in support of "critical" ground situations in the summer of 1950 was a terrible misuse of

airpower. Maj Gen Otto Weyland, the new vice-commander of FEAF, voiced his criticism by saying this "was like trying to dam a stream at the bottom of a waterfall."[6] Airpower is best used against the enemy's warmaking potential. While the need to divert missions in support of the ground forces may, at times, be imperative, it should not become the modus operandi. Indivisible application of airpower against interdiction and strategic targets must be given time to work. Only airpower can strike the enemy deep in his own territory where his communications are most susceptible to disruption. This in turn, will throw off the timing and tempo of his whole campaign, and air superiority is the sine qua non to accomplish this with acceptable losses.

The components of airpower in **CASE I** are susceptible to attack night and day. The air commander, in order to mitigate the effects of such attacks, has several options at his disposal. He can structure his forces to place at rear bases aircraft which can most leverage the enemy, provided they have sufficient combat range. This will remove high-valued assets from the reach of many enemy aircraft and force the enemy to penetrate several layers of defenses during his attack. The longer range aircraft, such as bombers and tankers as well as other, highly specialized aircraft with aerial refueling capability, could even be stationed at relatively "safe haven" bases. Those aircraft that cannot be moved could be dispersed on base, or among several bases, or protected in hardened aircraft shelters. However, caution needs to be exercised lest a commander become too reliant on passive defensive measures since historically the ability to

wage offensive warfare against fixed fortifications has progressed at a much more rapid pace than the ability to defend them. In the future, those technologies which allow for more autonomous aircraft operations and increased range should be emphasized; thus, not restricting an aircraft to a particular base for support.

Protecting the people that operate and maintain the aircraft and air bases present a unique quandary for the air commander. In order to accomplish their missions, they must be close to the very assets the enemy seeks to destroy. Thus, they are exposed to the effects of collateral damage. For example, at Spangdahlem air base where all of EUCOM's Wild Weasel aircraft are stationed, the people are sheltered in Survivable Collective Protection Shelters (SCPS) which for the most part are positioned between the aircraft shelters. An enemy attack on the shelters almost assuredly will result in the destruction of some of the SCPS. These losses could be minimized, perhaps, if the SCPS were positioned elsewhere on the base. Maybe dispersing some of the people off-base would be a better alternative if Host Nation agreements will allow.

When considering the effects of attack on an air base, careful attention needs to be given to the location and concentration of potential targets to include the people, aircraft, and support assets. Deception is another effective method for countering an enemy attack. The options for deception range from the use of decoys to changing the radar, infrared, and/or visual appearance of the air base. The historical precedent of operating from mobile/disposable air bases such as

Gen Kenney's campaign in the Pacific during World War II is a concept that was abandoned with the advent of high performance aircraft and sophisticated weapons and support structures. But given the promise of new technologies, this concept needs to be explored once again. If aircraft, weapons, and the support system could be made less dependent on air bases for effective combat operations, the air commander will gain much more flexibility in conducting his air campaign and the effects of enemy offensive counter air operations in **CASE I** wars will be much less effective.

The circular argument between the logisticians and the operators needs to come to an end. The argument goes something like this: Operators would like to have the flexibility of operating aircraft independent of the air base, but the logistics to support such operations is impossible; Logisticians would be more than willing to provide a support system that allows more autonomous aircraft operations, but the operators need to make their concept of operations known. These arguments are nothing more than a mask concealing the true reason we have not explored alternative operational concepts--money! Warfighting is not cheap, yet we continue to place peacetime efficiencies over wartime effectiveness. Given current budget deficits, this problem will not go away and feasible alternatives need to be explored today if we are to develop more effective airpower components in the future.

CASE II

CASE II wars give the air commander ultimate flexibility to

wage an offensive air campaign. With his bases nearly exempt from enemy attack, he can plan an air campaign that repeatedly strikes at the enemy's centers of gravity. Control of the airspace over his territory grants friendly ground forces the ability to position themselves almost anywhere along the front with relative impunity. In this situation, airpower alone can be the decisive element in winning the war. The biggest problems the air commander will face are determining which targets will most contribute to war termination and ensuring his offensive operations do not result in his reaching a culminating point that can be exploited by the enemy.

Concentration of force is the key to successful attacks on the enemy's infrastructure. With a target rich environment such as **CASE II** wars are likely to have, the tendency to attack a plethora of targets should be avoided. Instead, selected targets should be attacked in mass and repeatedly until the desired degree of destruction occurs. For example, in World War II Germany's electric power grid was one of the initial targets identified in Allied strategy, yet, except for "isolated raids" it was never effectively attacked. Instead, Allied bombing operations were diverted to other target sets because no discernible effect was noticed on Germany's warmaking potential after these early raids. A concentrated attack "was not undertaken partly because it was believed that the German power grid was highly developed and that losses in one area could be compensated by switching power from another. This assumption...was incorrect."

"The German electric power situation was in fact in a precarious

> condition from the beginning of the war and became more precarious as the war progressed; this fact is confirmed by statements of a large number of German officials, by confidential memoranda of the National Load Dispatcher, and secret minutes of the Central Planning Committee. Had electric generating plants and substations been made primary targets as soon as they could have been brought within range of Allied attacks, the evidence indicates that their destruction would have had serious effects on Germany's war production."[7]

There are two lessons to be learned from this experience. First, attacks on the enemy's infrastructure must be given time to work. In general, such targets are resilient and must be attacked in mass and repeatedly. Second, when looking at enemy industrial-type targets, a center of gravity can almost surely be found among electric power production facilities, fuel storage, communications facilities, or water supplies. I say this because each of these are critical to any industrialized nation--all other war production industries depend, in varying degrees, upon these to sustain their output.

This type of war also lends itself to mission-type orders where the air commander may be asked to delay second echelon forces for a specified number of hours or protect the flanks of friendly forces during envelopment maneuvers. Again, World War II provides an excellent example of this when Gen Patton asked 9th Air Force to protect his flank during his drive through France in 1944.

Guarding against reaching a culminating point must be a constant consideration during **CASE II** wars. The preponderance of offensive operations in wars of this type exact a constant drain on men, equipment and the support system. The enemy may attempt, through deception, to force friendly airpower to expend vast quantities of limited, "preferred" munitions against targets of

little consequence to their scheme of maneuver. In addition, surface-to-air defenses as well as interceptors may cause unacceptable losses to friendly aircraft. While no commander will continue to fly missions of high attrition, the cumulative effect of even isolated instances could seriously deplete friendly aircraft. In an attempt to season less experienced aircrews, a commander will have the natural tendency to give each aircrew a "piece of the action" and rotate crews among various combat missions. While this practice is necessary and desirable, caution must be exercised to ensure targets are not missed necessitating the mission be re-flown--thus doubling the risk to aircraft and aircrews. The bottom line is that the components of airpower should be constantly assessed vis-a-vis the enemy's capability to ensure that man, the aircraft, the air base, and the support system has a chance to catch up with the high tempo of offensive air operations prior to reaching a culminating point. Failure to recognize the approach of a culminating point could severely curtail offensive operations and relinquish the initiative to the enemy.

CASE III

This is a very dangerous situation for the air commander. The enemy can control the timing and tempo of the air war because it is he who will determine when, where and with what lethality he will attack. With his rear area relatively secure, he can position resources and combine assets to conduct the whole range of traditional air force missions effectively and efficiently.

Before an air commander decides upon a campaign strategy in this scenario, he should evaluate the reason he got into this

position. **CASE III** wars could come about because of political constraints caused by a lack of national will or a desire to not escalate the conflict. In this case, friendly air forces may be clearly superior to those of the enemy, but are politically restricted to defensive operations. From a planning perspective, this situation could arise in the future should the U.S. become involved in small wars or low intensity conflicts where it is quite possible that the U.S. would furnish defensive forces to protect a friendly power while host nation units are being trained on sophisticated equipment. For example, the U.S. may agree to guarantee the air defense of a country while national airmen and soldiers are being trained on defensive fighters and surface-to-air missiles. The purpose of such a commitment would be to counter an immediate threat while not directly attacking the aggressor to preclude possible intervention from outside powers. U.S. forces would then be withdrawn after the nation is able to provide its own defense. In this instance, friendly air forces are of an expeditionary nature. If the nation has ready access to the sea, perhaps Naval airpower could best serve this purpose because of the effective air defense network associated with a carrier battle group. If the nation is land-locked, Air Force aircraft will need to establish forward bases to conduct operations. In this circumstance, the air commander will need to consider the same alternatives as was discussed in **CASE I** with the notable exception of conducting offensive air operations. Depending upon the availability of resources, he may be able to position his forces outside of the effective range of the enemy

by using aerial refueling. However, accurate and timely intelligence information on impending enemy operations are the key to a successful campaign because without this he cannot muster the necessary defensive formations in time to thwart an enemy attack. Moreover, because of the expeditionary nature of the forces involved, friendly airfields will be more susceptible to the effects of an enemy counter air attack. If possible, U.S. air forces should not be committed in this manner because of the military risk to our forces and the political risk of significant loss of U.S. prestige should our air forces have to be prematurely withdrawn. Consequently, the best way to conduct operations of this nature are with Naval forces, air defense forces with aerial refueling, or long-range fighters stationed at secure air bases.

Another reason might be the commander does not feel he has the resources to wage an offensive campaign from the outset. This was the situation of the United Kingdom during the Battle of Britain. British commanders did not feel they had the capability to strike the Luftwaffe's bases in France. Thus the German bases were secure from British attack during the battle.[8] This situation was not as tenuous as the above example because the political resolve was present to employ airpower effectively once the capability for offensive operations was attained. As in **CASE** I, the commander may view this as the first phase of a campaign designed to bring about a culminating point in the enemy, or he may be waiting for sufficient reinforcements before transitioning to offensive operations. Essentially, he is practicing economy of force operations until he can strike decisively and seize the

initiative.

Finally, another reason could be that friendly air force losses are so extensive that the commander is forced into a defensive posture. Such was the case in Germany during Allied preparation for "OVERLORD". Repeated attacks on German industrial targets resulting in tremendous attrition of German fighters and the bombardment of Nazi occupied French airfields, prompted the Germans to pull-back fighters to protect Germany. Consequently, when the Allies launched 13,000 sorties on D-Day to support the invasion, the Luftwaffe answered with about 300 sorties which produced "literally no effect whatever."[9] This is the most dangerous and operationally significant scenario because the air war is on the verge of being lost and, historically, nations that lose the air war subsequently lose the ground war. In this case, the air commander has the overriding objective of regaining the initiative to pursue an effective air superiority campaign or at least cause a stalemate--thus, bringing about a **CASE IV** war. If, in his judgment, this cannot be done, he has the moral obligation to inform his political leadership through his chain of command that preparations should be made to sue for peace or attempt to resolve the conflict by other means. Prolonging a war that cannot be won will result in a less favorable settlement particularly after the enemy finds out the predicament of the capitulating nation.

The keys to not losing a **CASE III** war are "to inflict enough damage on the enemy that he becomes unable or unwilling to pay the price" and to have the necessary intelligence and command and

control systems available to ensure enemy formations are met with sufficient mass to effect such damage.[10] By doing this, the air commander is exploiting, perhaps, the only small advantage he may have over the enemy:

> "Simply, the enemy's motivation for offense, and thus his willingness to accept punishment, may be less than that of the defender. The attacker is hardly likely to throw his entire air force into the fray and lose it all before deciding to give up the attack. Conversely, the defender might not find it illogical to expend his entire force in an attempt to protect himself."[11]

I say the defender has only a small advantage because Clausewitz's postulate that in land warfare the defense is the more stronger form of conflict does not appear to remain valid in air warfare. Four factors explain this phenomena:

> "First, air forces have such tremendous mobility that they can attack from far more directions than can a land army.
>
> Second, the rapidity with which air forces move makes concentration against them more difficult than concentrating to defend against a land attack.
>
> Third, the defender on land normally has prepared positions from which he can fire at an attacker who must by definition move across open territory where he is at a decided disadvantage.
>
> Lastly, when air forces meet in the air, the differences between attacker and defender tends to blur (if not disappear entirely)."[12]

Consequently, a purely defensive air campaign is not desirable in warfare because the best it can achieve is to not lose the air war. Defensive air operations must be followed up with offensive operations to attain a decisive victory over the enemy. However, in the future, the continued improvement of surface-to-air missiles (SAMs) and beyond-visual-range (BVR) air-to-air missiles could improve the ability to conduct defensive air operations. A fighter engagement zone consisting of aircraft equipped with BVR missiles preceded by a missile engagement zone of enhanced SAMs,

might satisfy two conditions for effective defense. In this hypothetical case, friendly aircraft will be behind the "prepared positions" of an advanced SAM network and be able to strike the enemy at great distances--thus making use of "open territory" to attrit his aircraft. But even if these systems are developed, the other factors cited above do not appear to lend themselves to easy solutions in the future. Hence, defensive air operations seemingly will remain the weaker form of air warfare for many years.

CASE IV

War over the front restricts the options a commander may have to prosecute an air superiority campaign, and, "in this case air superiority is unlikely to be an end in itself; rather, it is needed to prevent enemy air interference with ground operations over or near the front, while permitting friendly air operations over corresponding parts of enemy territory."[13] Apart from the obvious condition where neither side has aircraft capable of penetrating the airspace of its opponent, this situation may occur because of political constraints. In the Korean War, airpower was prevented from conducting attacks north of the Yalu River and the Communists did not penetrate far beyond the front lines to attack American bases because they did not have sufficient forces to do so.[14] Partly as a result of Chinese intervention in Korea, the U.S. imposed even more severe political restrictions during the Viet Nam conflict where, for example, American pilots could not fire unless fired upon or were limited from attacking certain targets in the enemy's rear even though they were well forward of the Chinese border.

In a **CASE IV** situation, both friendly and enemy air forces retain the option of fighting or not when faced with an air threat over the front. If the enemy's doctrine is one of homeland defense, very little can be done, from an air superiority perspective, to lure him over the front lines and engage friendly fighters. In this instance, an air commander may consider deception employed at the theater or operational level. For example, intense offensive air support missions combined with a coordinated thrust by ground forces will present the enemy with a potential breakthrough situation. The aircraft the enemy sends to meet the threat can then be attacked by fighters that were positioned to ambush oncoming enemy formations. However, if an enemy has an air superiority doctrine, the mere presence of fighters over the front may be all that is needed to force him to engage.

Again, the air commander must evaluate his strategic objectives and determine whether the political constraints will prevent him from achieving them or will result in success only with unacceptable cost--"the operational commander must give his candid advice as to likely costs with and without the constraints".[15]

Barring political constraints, the air commander must consider his options if the situation changes. The introduction of long-range aircraft in theater will significantly effect his plans as well as those of the enemy. Should this occur he must be prepared to transition his campaign to fit one of the scenarios discussed previously.

CASE V

War without aircraft may be debatable in this day and age, but it is possible. Again, the commander must be prepared to cope with sudden changes in the situation should airpower be introduced. Just the uncertainty of such a situation would make many commanders tentative about over extending themselves as a hedge against the potential use of airpower.

This chapter was not meant to cover every situation an air commander could face. It was presented to add to the framework for viewing air warfare at the operational level and to assess the potential impacts which different types of war can have on doctrine and the components of airpower. The next chapter will look at the effects of war.

CHAPTER THREE NOTES

1. Richard E. Simpkin, Race to the Swift: Thoughts on Twenty-First Century Warfare (London, England: Brassey's Defence Publishers, 1986), 57-58.

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3. Ibid. 25.

4. Kreis, 154-156.

5. Warden, 42.

6. Futrell, 52.

7. Summary Reports, The United States Strategic Bombing Surveys (Maxwell AFB, AL: Air University Press, 1987), 33-34.

8. Warden, 20.

9. Haywood S. Hansell, Jr., The Air Plan That Defeated Hitler (Atlanta, GA: Higgins-McArthur/Longino & Porter, Inc., 1972), 190.

10. Warden, 68, 73-74.

11. Ibid. 68.

12. Ibid. 66.

13. Ibid. 77.

14. Ibid. 21.

15. Ibid. 81.

CHAPTER FOUR

THE EFFECTS OF WAR

The effects of war on a fighting unit's components and fundamental beliefs have a wide-range of implications for the operational commander. Although there are numerous effects of war that can be discussed, I have limited my choice to four specific categories that a commander will have to deal with regardless of the type of war he is in. Furthermore, these effects directly influence doctrine and the airpower components. They are the fog of war, friction in war, attrition, and enemy reaction (Figure 4). Although Clausewitz treats the fog of war as part of friction in war, military writers have traditionally separated this concept from the Clausewitzian description of general friction. Even Clausewitz recognized this as "one of the most serious sources of friction in war" and in so doing set it apart from his discussion of general friction.[1]

> "...the general unreliability of all information presents a special problem in war: all action takes place, so to speak, in a kind of twilight, which, like fog or moonlight, often tends to make things seem grotesque and larger than they really are.
>
> Whatever is hidden from full view in this feeble light has to be guessed at by talent, or simply left to chance. So once again for lack of objective knowledge one has to trust to talent or to luck."[2]

Hence, the fog of war can best be described as uncertainty and chance; and, in general, it effects doctrine and the commander's decision making process.

Chance and uncertainty are more prevalent in war than in any other human endeavor. The early part of the Korean war was characterized by Air Force missions routinely directed against targets that were nonexistent or located several miles from the

coordinates that were given for mission planning because of inaccurate maps used by target planners.[3] During the raid on Dieppe on 19 August 1942, the cancellation of aerial bombardment and the airborne assault because of uncertainty in the number of French causalities and the weather, respectively; the chance

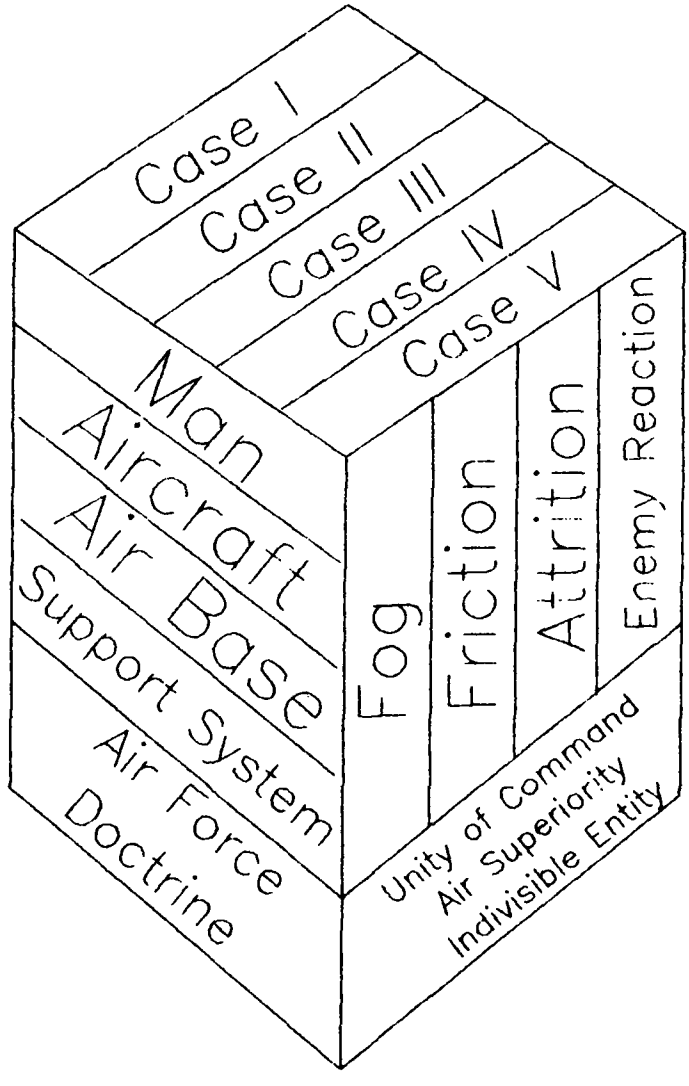

Figure 4. Conceptual Framework for Thinking About the Operational Level of Air Warfare

encounter with a German convoy by the assault force while crossing the English Channel; and the garbled radio transmission that led to the commitment of the reserves when the raid was already doomed to failure resulted in a tactical debacle.[4]

But there is another aspect to the fog of war worth discussing that occurs when the information received is reliable but misinterpreted--or, as Clausewitz states, the information is masked.

> "War has a way of masking the stage with scenery crudely daubed with fearsome apparitions. Once this is cleared away, and the horizon becomes unobstructed, developments will confirm his (the commander's) earlier convictions—this is one of the great chasms between planning and execution."[5]

In World War II, strategic bombardment of German industry vacillated among several target sets because U.S. planners were unsure as to the success of various raids and were continually struggling to find "the" strategic target that would end the German war making machine.[6] Looking back, 8th Air Force planners did schedule targets for attack that would have proved decisive such as electric power and synthetic fuel but the analyses of the results of this effort led Bomber Command to the conclusion that the execution of the plan was not giving the desired payoff. In Korea, communist forces used camouflage by day to hide their positions and moved by night to negate FEAF's armed reconnaissance missions. Confronted with the fog of war, FEAF assigned certain areas of operations to individual reconnaissance units hoping the pilots would become intimately familiar with the terrain and be better able to identify camouflaged objects. This program was a resounding success.[7]

In the above examples, one commander successfully overcame

the fog of war and the other did not. This helps illustrate the qualities a commander must have to deal with this phenomena.

> "If the mind is to emerge unscathed from this relentless struggle with the unforeseen, two qualities are indispensable: first, an intellect that, even in the darkest hour, retains some glimmerings of the inner light which leads to truth; and second, the courage to follow this faint light wherever it may lead. The first of these qualities is described by the French term, coup d'oeil; the second is determination."[8]

In the first example, 8th Air Force knew, by extensive studies, that these targets would eventually bring about the downfall of the Third Reich, but lacked the determination to follow through with the plan. In the second, FEAF knew the targets were there even though they could not be seen. The determination of FEAF to locate and attack these targets led to more effective scheduling of reconnaissance missions to help remove the fog of war. By studying how past adversaries have used the fog of war to their benefit with techniques such as camouflage, concealment and deception, the commander arms himself with the tools that can be used to increase the fog of war on his future adversaries.

The fog of war can come from two sources: one which is under the air commander's control and can be dealt with quickly and effectively; and another which is beyond his control and will need his coup d'oeil (or professional insight) and determination to overcome. The first can be characterized by the misinformation that is prevalent in many large organizations. It is an internally generated fog that often twists a commander's intent into something that is unrecognizable when it reaches the unit level. The best way to overcome this is to be sure your intentions are clearly stated and transmitted to subordinate

commanders. Periodically calling subordinate commanders and asking them how they are implementing one or more of your directives is a good check on the system your organization uses to pass information. By practicing this in peacetime, your chain of command will quickly police itself to ensure it conveys what you intended. Then, when war comes, you will not have to be overly concerned with whether your subordinates are being directed along the path you desire. The second source is much more difficult to surmount because it is the external fog generated by the war itself. Clausewitz's recipe of professional insight and determination appear to be the best weapons you can use against this source.

Professional insight comes from experience and knowledge. Since a commander cannot be the expert in all aspects of the war, he must ensure he has a staff that can complement his abilities. In other words, he must ensure he has an operational staff that can give him the information he needs when he needs it to make timely and accurate decisions. If people must come from outside the operational commander's staff to present information, then I would suggest the staff is not operational and must be changed. In addition, a commander should use his staff by seeking out innovative or perhaps radical solutions to overcome the fog of war. Again by practicing this in peace, you will ensure a staff that is uninhibited during war when you ask for potential solutions. If the favored solution suggests you operate outside of accepted doctrine and your professional insight causes you to believe this is the best course of action--then do it.

"Given the nature of the subject, we must remind ourselves that it is

> simply not possible to construct a model for the art of war that can serve as a scaffolding on which the commander can rely for support at any time. Whenever he has to fall back on his innate talent, he will find himself outside of the model and in conflict with it; no matter how versatile the code, the situation will always lead to the consequences we have already alluded to: talent and genius operate outside the rules, and theory conflicts with practice."[9]

Historically, technology and professional insight are the factors that have changed and molded our doctrine. Consequently, when a commander relies on professional insight in the face of uncertainty he may think he is acting outside of doctrine when in fact he is recognizing the need to change it.

A commander must realize that in war everything is uncertain and subject to chance. For example, we plan for spare parts availability based on exercises and peacetime use rates; however, the stress which aircraft and airmen will encounter in war may result in higher than expected replacement rates because the parts wore out quicker or because men misjudged the aircraft malfunction. Moreover, spares may be malpositioned resulting in an abundance of supplies at one base with a corresponding shortage at another. Munitions that are planned to be pushed to the bases may arrive late or be interdicted resulting in less than optimum combat sorties. Unexpected weather during a mission may force the strike package to return to base or hit an alternate target. A runway that is perfectly usable today may require extensive repair tomorrow; and the equipment required to repair the runway may be "down" for maintenance. Pilot post-mission debriefings may be somewhat exaggerated indicating more attrition against the enemy than actually occurred---this was a particularly vexing problem for the British in World War II. In some cases when presented with conflicting information a

commander may have only his insight or "gut feel" as to what actually happened to guide his future decisions. When confronted with uncertain, conflicting information, a commander should consider the source of the information and determine whether it can be verified independently. If possible, confirmation from a second source should be sought before a plan is altered.

Friction is that aspect of war that makes even the simplest action difficult. Whereas professional insight and determination can overcome the fog of war, friction requires the commander to use other techniques to mitigate its effects. As we shall see, friction and the remaining effects of war impact not only a commander's decision-making process and doctrine, but also the components of airpower.

> "Friction, as we choose to call it, is the force that makes the apparently easy so difficult. We shall frequently revert to this subject, and it will become evident that an eminent commander needs more than experience and a strong will. He must have other qualities as well."
>
> "Friction is the only concept that more or less corresponds to the factors that distinguish real war from war on paper."[10]

In looking at factors that comprise friction, Clausewitz refers to the role of danger and physical exertion:

> "Danger is part of the friction of war. Without an accurate conception of danger we cannot understand war."
>
> "Our reason for dealing with physical effort here is that like danger it is one of the great sources of friction in war. Because its limits are uncertain, it resembles one of those substances whose elasticity makes the degree of its friction exceedingly hard to gauge."[11]

Danger in war can only be understood from the human perspective because ultimately it is human reaction to danger that results in mission success or failure. For example, during the Korean war, airpower was constantly diverted from primary

missions because the ground situation was deemed critical--men's lives were in danger. Often this determination was made far removed from the battlefield by a group of staff officers in Tokyo who interpreted information based on their biases and perceptions. Frustrated in his attempts to put together a coherent air campaign, Gen Stratemeyer, the commander of FEAF, confronted Gen MacArthur by saying, "Your directions to me will be conducted in the most efficient manner that we can plan, and I am sure that it is not your intention to tell me how to do the job." At this point, Gen MacArthur, recognizing what was happening, told Gen Stratemeyer to run the air campaign as he saw fit regardless of the instructions received from the Group Headquarters Staff.[12] The danger of war in this example resulted in decisions being made by the wrong people and in the wrong place. Gen Stratemeyer had to put his career on the line to change this situation into a more combat effective one that could overcome the friction caused by danger.

Danger generally results in the increased consumption of ordinance: for example, the fighter that must drop its bombs in order to maneuver against an air-to-air or SAM threat, or the infantryman who fires blindly into a bush because an enemy soldier was spotted. As a commander, you should look at increased consumption of ordinance with a critical eye. The reason for it may be as simple as an increase in tempo of the campaign or it may be that you are placing your men into more dangerous situations. In some cases, it could be the influx of new airmen without combat experience overreacting to the threat.

But whatever the reason, it is worth your while to determine it because you may uncover a source of friction your men are experiencing that you have not anticipated.

Closely related to danger is fear and the inactivity it brings as men try to overcome their circumstances. "Frozen with fear" is a phrase that applies not only to the men engaged in the battle but also to those who are removed from it. Staff officers who reluctantly schedule a strike mission because they are fearful of the loss of lives and machinery are, perhaps, manifesting the fear they experienced when a previous mission resulted in higher than expected attrition. But perhaps fear or risk-aversion is even more basic than that. The military reflects the society it is designed to protect, and there is strong evidence that U.S. society has grown more fearful and will accept less risk than two decades ago. One has only to think of the nation's reaction to the fire onboard the first Apollo spacecraft and compare it to the Challenger disaster 19 years later. In the former, the Apollo program went ahead and put a man on the moon within 18 months and the deadline set by President Kennedy--danger and fear were met with action. In the latter, "it took NASA almost three years to send up another shuttle. NASA even reached the stage, as members of its staff said, of taking so many precautions that it was in danger of enlarging, instead of diminishing, the possibility of malfunction"--danger and fear, in this case, were met with inaction.[13] Coping with fear is beyond the scope of this paper. Suffice it to say that failure reinforces fear and danger, and like friction its effects accumulate and ultimately impedes

forward motion. Conversely, success helps to negate fear, restores self-confidence, and allows an individual or group to act with more audacity. A commander must take this into account when he develops a campaign plan.

Physical effort in air warfare refers not only to the effort exerted by the aircrews and maintenance people, but also by the aircraft, air base and the people who keep the base operational, and the support system. What are the physical limits of the components of airpower in war? If we view these components as a system of systems, which sub-system is the weakest link and when will it fail during combat? These are fundamental questions which our current commanders can answer better than I, and our future commanders should be studying because the failure of any one system will impede the whole combat effort.

In the past, when we have operationally tested Air Force Combat Wings, we generally exercised the aircrews, aircraft, maintenance and a small portion of the support system. The emphasis has been on generating a maximum number of sorties while simulating the accomplishment of combat damage repair to men, equipment, and systems. After SALTY DEMO, an exercise that simulated a conventional/chemical attack on an air base (and the first exercise that did not simulate away combat damage on a large scale), our operational readiness inspections (ORIs) have gradually changed emphasis. Today, we make a better attempt to exercise all of the components of airpower but we still have a long way to go because when push comes to shove, getting aircraft into the air is paramount, as it should be, but we continue to

simulate-away many of the conditions that impede the sortie generation process--we simulate-away friction because it makes our job too hard. This practice needs to change if we are ever to get a clear picture of our combat capability. The friction we get during an ORI is small compared to what we can expect in war, and if we continue to ignore it in peacetime we are only doing the Air Force and our country a disservice. A commander's ability to handle friction should be part of the ORI grading criteria.

How do we prepare for the effects of friction? Clausewitz answers this question quite eloquently:

> "Combat experience...and a commander and his army will not always have this available."
>
> "Peacetime maneuvers are a feeble substitute for the real thing; but even they can give an army an advantage over others whose training is confined to routine, mechanical drill. To plan maneuvers so that some of the elements of friction are involved, which will train the officers' judgment, common sense, and resolution is far more worthwhile than inexperienced people might think."
>
> "This is true even of physical effort. Exertions must be practiced, and the mind must be made even more familiar with them than the body. When exceptional efforts are required of him in war, the recruit is apt to think that they result from mistakes, miscalculations, and confusion at the top. In consequence, his morale is doubly depressed. If maneuvers prepare him for exertions, this will not occur."
>
> "A state that has been at peace for many years should try to attract some experienced officers--only those, of course, who have distinguished themselves. Alternatively, some of its own officers should be sent to observe operations, and learn what war is like."[14]

Attrition has always been a concern of commanders because it effects how they intend to employ their forces. Attrition is particularly important for air forces because unlike the army, an air force depends upon machines to exist and fight. An army depends upon machines for mobility and some firepower, but men under arms are the backbone of the army. Conversely, an air

force must fight with aircraft manned by highly skilled individuals. If you strip the aircraft away from an air force, it would no longer be an effective fighting force.

The difference between the way the Air Force plans for attrition in peace and manages attrition in war is quite striking. During peace, attrition factors drive the amount of spare parts and weapons needed to maintain and arm aircraft. In general, these attrition factors are quite low. Consequently, if a commander expects wartime attrition to exceed peacetime planning factors he would be comfortable in knowing there should be enough parts and weapons to support his aircraft. This does not mean a commander should plan for high attrition, but he should understand this to better manage the forces he has. What the planned attrition factors do not take into account is the fact that the parts and munitions themselves will suffer attrition in war either through collateral damage or by direct enemy attack. So, when a commander assesses the effect of attrition on his forces, he would be remiss not to include attrition on his support system, air base, and people. It is quite possible that attrition on the components of airpower, excluding aircraft, would limit the options he has to achieve the objectives in his campaign plan.

Another aspect of attrition is that historically we lost as many, if not more, aircraft to non-combat causes as to direct combat. For example, of the 1466 aircraft FEAF lost in Korea, about 750 were attributable to enemy action the remainder were lost because of "nonenemy causes."[15] Over a one year period from

1 January 1943 to 1 January 1944, the Luftwaffe lost 2896 fighters due to combat. Their non-combat fighter losses over the same period were 2282 aircraft.[16] These historical figures are important because they indicate that during a war of appreciable duration, a commander can expect his total attrition to be double that caused by enemy action. If you believe the next war will be short, these figures may not be that significant.

The effect of attrition on the tempo of operations should also be considered. For example, if you assume all available aircraft will be used on each day of the war, a 15 percent daily attrition will result in the loss of 90 percent of the available aircraft in 15 days. A 10 percent loss rate will attrit 90 percent of the aircraft in 22 days; 5 percent loss rate will attrit 90 percent of the aircraft in 45 days; and so on. Consequently, the effect of attrition on a commander's campaign plan must account for his perception of how long the war will continue based on the success of achieving strategic objectives; at what point will the air forces cease to be effective i.e. when 50 percent is attrited, 60 percent, etc.; what effect are his air forces having on the enemy's airpower (subject to the uncertainty of all information); and what effect is the enemy having on the other components of airpower. After all the above ingredients are evaluated, a commander will be in a better position to manage attrition. He can then make the judgment as to whether the risks are worth the potential gains, can decide if his campaign plan should be adjusted, can determine how much effort can be given to support the ground forces, and can ascertain how the battle for air superiority is proceeding.

The last effect of war I chose to discuss is the enemy's response to the commander's campaign.

> "In war, the will is directed at an animate object that **reacts**. It must be obvious that the intellectual codification used in the arts and sciences is inappropriate to such an activity. At the same time it is clear that continual striving after laws analogous to those appropriate to the realm of inanimate matter was bound to lead to one mistake after another."[17]

Enemy reaction to a commander's campaign plan is necessarily unpredictable and this fact must not be lost when considering the operational level of war. The same considerations that may cause a commander to alter his campaign are also at work in the mind of the enemy. He will alter his doctrine when faced with one defeat after another, he will strive to remove the inflexibility of his command and control system if it is not working as planned, and he will do all in his power to defend against and then counter his enemy's attacks.

Such was the case between the 1967 and 1973 Arab-Israeli wars. "In 1967, the Israelis destroyed the Egyptian and Syrian air forces on 5 June and then proceeded to lay waste the Egyptian army in the Sinai, where Israeli command of the air had made life intolerable for the Egyptian soldier."[18] After the humiliating defeat in 1967, the Arabs determined their airfields and missile defenses were inadequate. Consequently, between the wars they hardened their air bases and procured and mastered advanced SAM and anti aircraft gun systems. When war broke out in 1973, the Israeli Air Force proceeded much the same as in 1967 by attacking the hardened air defense sites. They soon learned that their enemy had reacted to the 1967 defeat by quantitatively and qualitatively improving their air defense zones.[19] The Israeli

Air Force lost over 100 aircraft to SAM defenses which they could not defeat until they reacted properly to the situation and changed their campaign plan. Eventually, the Arab SAMs were defeated not by direct attacks, but by flank attacks and the use of joint forces.[20, 21] They paid a heavy price to learn this simple lesson.

This lesson is also applicable to the strategic level of war where political decisions play a more prominent role. When it was apparent United Nations Forces would defeat the North Koreans, Chou En-Lai, the Chinese Communist foreign minister, warned that China would send troops into North Korea if U.S. or United Nations forces crossed the 38th parallel. President Truman dismissed the Chinese warning by stating, "it appeared quite likely that Chou En-Lai's 'message' was a bold attempt to blackmail the United Nations by threats of intervention in Korea." On 28 November 1950, Gen MacArthur reported, "Enemy reactions developed in the course of our assault operations of the past four days, disclose that a major segment of the Chinese continental armed forces...of an aggregate strength of over 200,000 men is now arrayed against the United Nations forces in Korea." As a consequence, Gen MacArthur had to order his forces to change from the offensive to the defensive. Luckily, he had considered this possibility and had been prepared to execute it should the need arise.[22] No one wanted the Chinese to intervene in the Korean conflict, and some might not have anticipated it. Fortunately, the operational commander in this instance did, and had an alternative course of action prepared.

The effects of war discussed above are not intended to be all-inclusive and few, if any, suggestions were made to help reduce their impact on the commander. They were chosen to provoke critical thinking in all who are concerned with air warfare at the operational level. The examples cited were simply a way to illustrate the effects and other commanders' responses to them. The exact solution to these and other effects can never be solved with timeless principles prescribed in a checklist, they can only be approached through the study of military history and through experience. By developing his professional insight and critical thought processes, a commander will be better prepared to mitigate the effects of war in the future.

CHAPTER FOUR NOTES

1. Clausewitz, 117.

2. Ibid. 140.

3. Futrell, 52.

4. Air War College, Resident Syllabus and Readings: Course DS 615, Book 2, Joint Specialty Program (Maxwell AFB, AL: AWC, 1988), 10-18, 10-35 to 10-38.

5. Clausewitz, 118.

6. Air War College, Readings Book 2: Military Strategy Analysis-DS 611 (Maxwell AFB, AL: AWC, 1988), 47.

7. Futrell, 352.

8. Clausewitz, 102.

9. Ibid. 140.

10. Ibid. 119, 121.

11. Ibid. 114-115.

12. Futrell 47-48.

13. Henry Fairlie, "Fear of Living: America's Morbid Aversion to Risk", The New Republic, 23 January 1989, 14.

14. Clausewitz, 122.

15. Futrell, 691-692.

16. Williamson Murray, Strategy for Defeat: The Luftwaffe 1943-1945 (Maxwell AFB, AL: Air University Press, 1983), 306.

17. Clausewitz, 149.

18. Warden, 16.

19. Air War College, Resident Syllabus and Readings: Course DS 615, Book 3, Joint Specialty Program (Maxwell AFB, AL: AWC, 1988), 14-23.

20. Ibid. 14-53.

21. Warden, 19, 36-37.

22. Futrell, 200-201, 239.

CHAPTER FIVE

CONCLUSIONS

This paper was an attempt to help Air Force officers understand air warfare at the operational level. It started with some basic, specific concepts of doctrine and the components of airpower and moved into the more intangible realm of the types of war and its effects. The purpose was not to provide a "cook-book" approach to prepare future commanders for air warfare, but rather to provide a conceptual and theoretical framework that will encourage the development of flexible and critical thought processes as we try to understand the operational level of war. It is also not all inclusive because there are many other aspects of warfare that need to be explored and understood. Some of the thoughts presented may be controversial, but the discussion and debate they inspire will lead to a better understanding of the operational level of war.

In the first chapter, I presented our fundamental doctrinal beliefs and should how they made sense at the operational level. Moreover, I introduced the conceptual framework that was used throughout the study to help bring together the interaction of the many factors that influence a commander's operational decisions. The second chapter looked at the components that comprise airpower and related these to our doctrinal beliefs. The third chapter then took the framework developed thus far and looked at the impact that different types of war, from an airpower perspective, might have on our doctrine and airpower components. Using a building block approach, I then overlaid some of the effects of war and explored the potential outcomes

that could occur under various scenarios, thus completing the framework introduced at the beginning of this study.

The major conclusions that should be drawn from this paper are first, an operational commander must understand his doctrine and what constitutes his airpower because these are the centers of gravity of his armed forces. Second, he must analyze the type of war he is undertaking and understand the constraints imposed upon him by his force structure, strategic aims, and political directives. Finally, he must comprehend that war is conducted by individuals attempting to impose their will on an animate enemy and because of this fact, war will necessarily involve luck, chance and uncertainty thus making the apparently easy tasks very difficult. As a consequence, a commander must anticipate the unforeseen and develop a campaign plan that can adapt to changing situations caused by political considerations, attrition, and enemy reaction.

By discussing and studying the operational level of air warfare, a commander will be better prepared to assess the impact that will occur because of technological change and professional insight gained from the experience of past and future battles. Hopefully, this paper will provide a basis for further intellectual efforts as USAF officers continue to investigate this most fascinating and complex topic.

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